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THE MOTOR CAR

ITS
NATURE USE & MANAGEMENT

UC-NRLF



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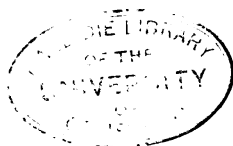


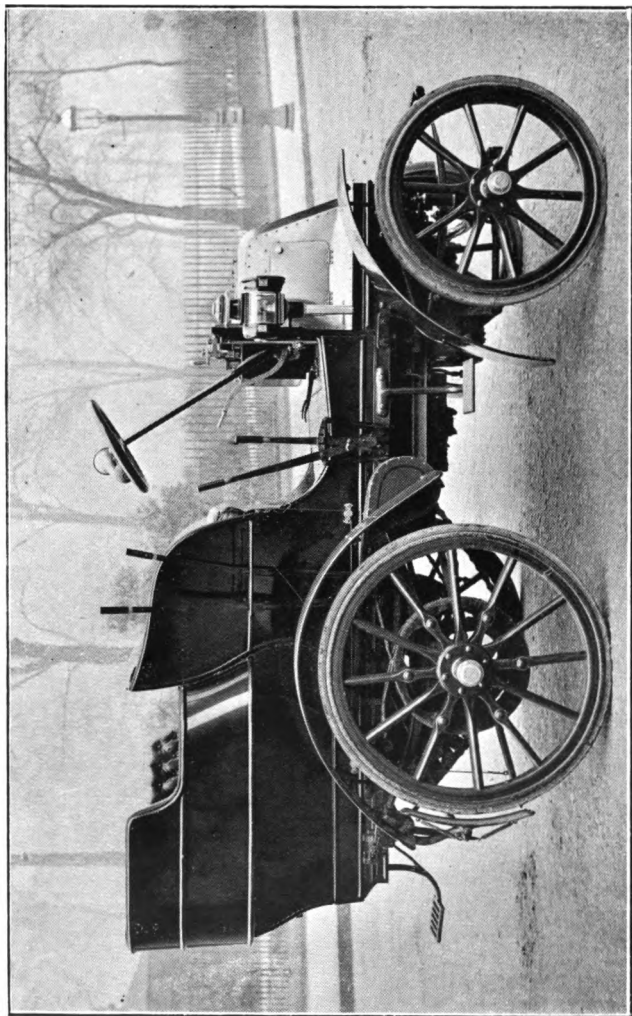
SIR HENRY THOMPSON



THE . .
MOTOR-
CAR . .







THE AUTHOR'S MOTOR-CAR, 6½ H.P.

THE MOTOR-CAR

AN ELEMENTARY HANDBOOK

ON ITS

NATURE USE & MANAGEMENT

BY

SIR HENRY THOMPSON BART.

F.R.C.S., M.B. LOND., ETC.

WITH ILLUSTRATIONS



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PREFACE

I HAVE ventured to furnish a simple account in the form of an Elementary Handbook to explain the nature of the chief forms of existing motor-cars, and the mode of managing those most commonly used, *i.e.*, those impelled by petrol, for beginners who may desire to obtain such information. Soon after becoming possessed of one myself, I was naturally anxious to learn the *modus operandi* of my machine—its “Anatomy and Physiology,” if I may be permitted to use the term. I therefore took pains to examine every portion of its interneconomy, and learn how its rapid and powerful movements were produced; and, further, what was the mechanism by which the driver was able to exercise complete control over it

at his will, by means of various handles, pedals, brakes, &c.

Again, it became manifest from my earliest experience of this new form of locomotion that there was an ethical question by no means to be lost sight of, in which the drivers of horses and of motor-cars were equally interested. This I raised in my first letter to the *Times* in August of last year, and is the reason for now reprinting it and three other letters, from the long correspondence which followed in consequence during the late summer season.

If the result of my little work is to make the whole subject of motor-car driving more easily understood by young motorists generally, and especially to aid in promoting better relations by the exercise of mutual accommodation and courtesy between horse drivers and motor drivers, I shall be amply repaid for my brief labours in connection with a very interesting subject.

HENRY THOMPSON.

March 1902

CONTENTS

	PAGE
INTRODUCTION	9
THE AUTHOR'S MOTOR-CAR	13
<i>The Times</i> CORRESPONDENCE	17
<i>The Times</i> LEADING ARTICLE	26
VARIETIES OF MOTOR-CARS IN USE	52
I. THE MOTOR DRIVEN BY PETROL: ELECTRIC	
IGNITION	53
II. MOTORS DRIVEN BY STEAM	62
III. THE MOTOR DRIVEN BY ELECTRICITY	63
MOTOR ROUTES FROM LONDON	81
INDEX	107

LIST OF ILLUSTRATIONS

<i>Pl. I. The Author's Car . . .</i>	<i>Frontispiece</i>
<i>„ II. Working parts of a 6½-H.P. Daimler Motor . . .</i>	<i>facing page 55</i>
<i>„ III. Interior of Gearing-box, showing Gear and Differential . . .</i>	<i>„ 60</i>

INTRODUCTION

THE modern Motor-car has proved to be for myself an acquisition of power so valuable, and an addition to the pleasures of life so agreeable, that I have naturally desired to make myself thoroughly acquainted with its mechanism and mode of working. Accordingly I have practically studied the chief varieties of motor-cars which have been designed and employed, and have found it a very interesting pursuit. The results are embodied in the following pages. There can be no question that this new method of locomotion is destined to become not only one of great value to commerce by saving time and labour, but also by largely increasing the means of obtaining pleasurable relaxation during the seasons,

B

whether brief or prolonged, devoted thereto, which fall to the lot of all occupied men who possess the means of keeping a vehicle for the purpose. The opportunities of enjoying our beautiful country scenery, and that also afforded by the rapidly passing panorama replete with objects innumerable, illustrating human life, its occupations and interests, whilst passing through towns and villages, far transcend those provided by other kinds of travel. The earliest mode of locomotion—after that furnished by the use of one's own limbs—was at first limited to the employment of horses in various ways; the chief accommodation provided for the travelling public being by the Stage-coach in this country and by the Diligence on the Continent, both of which I enjoyed long before the era of Railways arrived. At that early period a long day was spent in traversing 100 or 120 miles, but although the novelty of the scenes, the close contact offered with the population, and the acquaintance with the towns and cities traversed was equal to that of the motor-

car, the tedium of the slow rate of progress made it very fatiguing, as I can well remember as far back as between 1825 and 1840. The age of railways, commencing about 1830-45,* revolutionised our ideas as to the possible rapidity of locomotion. But the traveller sees little or nothing of the towns through which he passes, while the owner of a motor-car regains the intimate acquaintance with the local characters of the town life which the Stage-coach and Diligence afforded, only much more easily, rapidly and economically than the former traveller by the Stage or by posting possessed.

It may be remembered, perhaps, that I raised the question of the important relations which exist between Motor-car drivers and Horses and their drivers, by letters to *The Times* in July, August and September of last year. These relations still exist, are as important as ever, and my almost daily experience on the road proves that

* The Liverpool and Manchester was the first: opened Sept. 15, 1830; long remembered by the accidental death of Huskisson, caused by the train.

the same hints in regard to management, mutual concession, and courteous procedure are still needed. Hence these letters are republished at the commencement of the volume, together with *The Times* Leading Article on the subject which confirmed and enforced the views set forth.

Moreover, I have offered my readers descriptions of the three chief varieties of Motor, together with numerous practical hints relating to the management of the first-named, in a concise form. Finally, I have appended a large number of routes, systematically arranged for the best roads throughout the country in every direction, and extending to about 300 or 400 miles from London; and the whole, I trust, will form an elementary handbook for the inquirer or young motorist who may desire to possess these various particulars in one small pocket volume.

THE MOTOR-CAR

I BECAME the possessor of a modern motor-car in the course of June last, purchased of the Daimler Motor Company, Author's car. Limited, of London and Coventry, which may be described technically as follows: "A Daimler 6½ H.P.,* with Tonneau body, driven by petrol, ignited by electricity." It has two side levers for regulating speeds, and backward and forward motion, also three brakes in accordance with the latest and most approved system, together with a "sprag"† below.

* The two capitals H.P., which will be frequently used, signify "Horse Power."

† A "sprag" acts for a motor as a "drag" does on a horse-driven carriage. It consists of an iron rod about three feet long, pointed at the free end, the opposite end being attached to the rear axle. When let down it prevents the car from running backwards,

I obtained the services of an efficient and practised driver with three or four years' experience, and good knowledge of the machine itself, who has driven me ever since. He accompanied me with it to the country, for the purpose of fully testing it, for a period of some nine or ten weeks. I made Boxmoor, in Hertfordshire, my headquarters, and thoroughly explored that and the two adjacent counties, Buckinghamshire and Bedfordshire. The weather was remarkably fine; on three days only some thunder showers prevented my using the motor. On all other days it was used, without exception. I enjoyed travelling by it exceedingly during the long days, spent for the most part in passing through varied and beautiful scenery, in fine pure air, as I could easily do at the rate of fifteen or sixteen miles an hour; and it proved to be an exhilarating exercise, and certainly benefited my health. But there was one drawback,

if it fails from any cause to ascend a steep hill; and is, therefore, an indispensable part of every well-equipped car.

and I confess to having felt it a serious one. The motor-car, although to myself delightful, was but too obviously regarded by the population generally, especially by the drivers and riders of horses, as an unwelcome intruder. The drivers above mentioned often lost their tempers—and did not ^{Our reception.} conceal the fact—not only with me, but, what was worse, with their horses, who suffered from the treatment of their unwise and angry masters. I was, therefore, desirous to create, if possible, a better understanding between the motor driver and that large number of persons who, either for business or pleasure, chiefly occupied the roads from morning to night, and who for the most part regarded the motor with disfavour.

Hence I wrote, with the object just mentioned, setting forth my views and how they might be carried out, a ^{Letters to} "The Times." letter to *The Times*, which appeared on August 27, 1901. It led to a very large correspondence during the following two or three weeks, with suggestions and

criticisms of all kinds, and with some valuable hints. Among these appeared a very interesting letter on the 31st, by Sir Edmund Monson, the British Ambassador to the Court of France, describing with much humour the automobiles of Paris, their great number, the extreme rapidity with which they were driven, and the somewhat extravagant habits of many of their occupants. I replied to most of these communications in a second letter, which appeared on September 5, and on the same date there was a *Times* leader summing up and commenting on the information obtained at considerable length. A third and last letter of my own followed on September 21.

All these letters, together with the article named, follow here in the order of their appearance, inasmuch as they express my own views, in a brief compass, on the subject then in question as well as those of others.

CORRESPONDENCE

The Times, August 27, 1901.

LETTER I.

MOTOR-CARS AND HORSES.

To the Editor of *The Times*.

SIR,—Permit me to offer a few remarks on a very serious question relative to the management of motor-cars, suggested by the dangerous accident reported as occurring at Rickerscote on Saturday last. I should not venture to do so had I not some little experience of the subject, which, I trust, may be of service to others.

I have been using a well-appointed motor of good size and power during the last two months, with a skilled and very careful driver of four years' standing, through most parts of the counties of Herts, Bucks and Beds, as well as of North Middlesex to London. We have, of course, met with numerous instances of horses, particularly among those which are well bred, shying dangerously, especially when meeting the motor, and sometimes, not often, on being passed by it; ponies, as a rule, taking little notice. I am quite

Drivers of
horses to blame
for accidents.

satisfied from what I have myself witnessed, and my experienced driver has long formed the same conclusion, that the danger is much more due to the action of the driver of the horse than to the animal itself. In nine cases out of ten he fears, not unnaturally, that his horse may shy, and begins to pull the reins tight and to lash him severely with the whip, to force him to meet the coming car, thereby making him nervous and excited. This is the worst possible preparation for the encounter. The horse ought, on the other hand, to be gently checked in its speed, the whip should be untouched, and the near rein a little tightened so as to cover the offside eye with the blinker, and prevent the animal from seeing the car as it approaches, at the same time addressing a word of friendly encouragement to the animal. It is a complete illustration of the truth of the old proverb, "You may often lead when you cannot drive."

I am unable to number the instances in which, when, having watched a horse coming up the road some thirty or forty yards off, with ears erect, evidently alarmed, my driver has slackened speed, and even stopped engines to prevent a noise, I have put up my hand to stop the approaching vehicle, and begged to be allowed to lead the animal

**How to teach
a horse.**

THE MOTOR-CAR — 19

gently up to the motor, so that he may look at it quietly ; and have even given him a mouthful of fresh grass from the roadside, which he munched readily enough at the side of the engine. I have frequently seen a horse turn completely round, with danger to the vehicle and its occupants, and by jumping out instantly have been able to persuade his driver to let me submit him to the same process.

The lesson of how to meet the motor, and the fact of its perfect harmlessness, have to be learned by the horse, and there is only one way —the gentle one. I well remember when the horse had to learn the same lesson relative to the railway train, and how many took fright as they saw one rushing by near at hand, or when going under a railway arch a train passed over it with a bewildering roar. If properly managed, I believe that our sagacious friend will soon and easily learn the new lesson now before him. And it is our duty as motorists to help him.

I am, yours obediently,

HENRY THOMPSON.

Sir Edmund Monson's Letter to *The Times* of
August 31, 1901 :

MOTOR-CARS AND HORSES.

To the Editor of *The Times*.

SIR,—Perhaps it may be permitted to one who can recollect the period when railway trains were still an object of intense terror to horses—not only to spirited animals, but to those ordinarily quiet and steady—and who now lives in a country where the use of the motor-car is developed to an extent which untravelled Englishmen can hardly conceive, to state in your columns the impression made upon him by the readiness with which French horses have accustomed themselves to the sight, sound and smell of these monsters, the automobiles. I use the word “monster” advisedly, since the glaring colours in which most of them are painted, the excruciating noise which they make when going at their average rate (outside Paris) of at least forty kilomètres an hour, and the asphyxiating odour emitted by their engines, to say nothing of the appearance of their inmates enveloped in gowns and protected by hideous masks, causing them to resemble the demons of a travelling circus, are calculated to produce the impression of a diabolical phenomenon.

Motor-cars in France.

The afternoon drive in the Bois de Boulogne has lost much of its enjoyment for those of the Parisians who still venture out in horse-drawn carriages, owing to the rattle and stench of these hideous vehicles, and the clouds of dust raised by their immoderate rapidity. But to my surprise neither my own horses nor those of any of my acquaintances have ever, as far as I know, had their equanimity disturbed by these offensive apparitions; Horse's
equanimity. and at this little seaside town, where the proportion of motor-cars to the number of the inhabitants and visitors is even more striking than at Paris, and where the utmost recklessness, as I know to my cost, is shown in driving them at express speed along the narrow streets, neither the saddle nor the carriage horses show any restiveness or alarm at their vagaries.

My belief is, therefore, that, as soon as the use of the motor-car becomes more general in England, it will be found that horses will be as indifferent to them as they now are to the railway train; and I confess that I am almost sorry, in my dislike of the invention, to think that such will probably be the case.

Your obedient Servant,

EDMUND MONSON.

HOULGATE, CALVADOS, August 29.

The Times, September 5, 1901. LETTER II.

MOTOR-CARS AND HORSES

To the Editor of *The Times*.

SIR,—The single source of discomfort which I soon experienced as an alloy to the pleasure derived from the daily use of my motor-car during the last two months, in three adjacent counties, described in your issue of August 27, was the hostility with which I was regarded by the drivers of horses I met with. By not a few it was loudly expressed, sometimes in terms not admissible in these columns. Hence my endeavour to bring about a better feeling between us, and an attempt to show what I felt was error, due solely to want of thought on their part; and I made it my business to show how much gentleness would achieve in the way of improvement.

Naturally I have been pleased to see how much interest has been taken in the subject, and how many correspondents have expressed their hearty approval of the recommendations made. Others have made suggestions which indicate want of practical knowledge of the motor-car, and one at least has expressed in

very strong terms views which demand from me a reply.

As an example of the last named, one gentleman recommends that, as the legal speed is said to be twelve miles an hour, a motor should be constructed so as not to be capable of running faster. Had he known the principles of motor construction and driving, he would have been aware that no car thus limited in power would ascend a steep hill, or the motor driver would, like a cyclist, have to push his machine up the hill. It is necessary to have a reserve of power for hill-climbing, so as to be able to ascend a very steep one when met with. My motor is geared for 4, 8, 12, and 16; No. 4 is reserved for the steepest, the 8 and the 12 sufficing for ordinary ascents.* The 16 gear, by using the accelerator, can be augmented to twenty miles or a little more; but the rate at which I drive on a level, straight, roomy road, where I can see my way well, is a mile in four minutes, producing, with hill-climbing, about an average of twelve miles an hour. With this power in reserve, one descends a hill by the simple weight of the car—no machinery

* A few lines are altered here: the same meaning was expressed in the original letter, but I was not at that time sufficiently acquainted with the machinery to express myself in terms technically correct.

going, when all noise ceases, the latter fact being a considerable influence against disturbing horses.

Of the proposal to number motors with conspicuous letters, I need say no more than that, if this were adopted, it must be applied to carriages of all descriptions without distinction.

**Numbering
motor-cars.**

Lastly, I must be permitted to refer to the letter of Sir Edmund Monson, which appears in your journal of August 31. Being old enough to have travelled before any passenger railway existed in this country, I also recollect well the period when railway trains were objects of intense fear to horses, and the time it took for them to be accustomed to them; as it subsequently did to get used to the ordinary bicycle. But the sketch of French automobile driving as practised even in the delightful "Bois" and suburbs of Paris, including, as it does, such descriptive terms as "monsters," "excruciating noise," "asphyxiating odour," with inmates "enveloped in gowns, protected by hideous masks," like "the demons of a travelling circus," giving "the impression of a diabolical phenomenon," is, I have no doubt, intentionally highly coloured. There are other terms of a similar kind, but the above suffice.

I wonder what Sir Edmund's Parisian friends

will think of this picture of French refinement, which we in England have long learned to appreciate and esteem.

Something *not*
managed better
in France.

I can assure him that no such scenes are presented in the parks of London, and, I dare to say without hesitation, never will be. I have traversed them quietly with my own motor, but no rate approaching to "at least forty kilomètres an hour" would be attempted. No odour is ever emitted, and it is only exceptionally, as when dust and small flies are prevalent, that I wear any other than my ordinary spectacles. For example, I drove to Bedford from Hemel Hempstead yesterday, thirty-five miles out, in all seventy, in about $5\frac{1}{2}$ hours, an average of about twelve miles an hour, without any other glasses, as recent rains had laid the dust. And when I wear the "goggles" they are faintly neutral-tinted glasses with narrow, pale, coffee-coloured surroundings.

I am glad to see by *The Times* of this morning that an English gentleman resident in Paris expresses his belief that Sir Edmund's opinion is hardly fair.

I have expressed myself as briefly as possible, and trust I do not occupy too much space.

Your obedient Servant,

HENRY THOMPSON.

WIMPOLE STREET, Sept. 3.

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Leading Article on the Subject in "The Times"
of Sept. 6, 1901.

The motor-car, as every one assures us in phrase as new-fangled as itself, has come to stay. We cannot doubt it. It is the fashionable craze of the hour, and may, as a mere fashionable craze, like the cycle a few years ago, be only a nine days wonder, as one of our correspondents says. But when the nine days are over and the wonder has subsided the motor-car will assuredly stay behind. We shall always have it with us henceforth, and we must all make the best of it. It is easy to draw an indictment against it, and, as it is so easy, we refrain, more especially as we cannot improve on the pathos and good humour of Sir Edmund Monson's recent letter on the subject. All the counts of such an indictment rest ultimately on

**"New-fangled,
unfamiliar, and
imperfect."**

the fact that the motor-car is new-fangled, unfamiliar, and imperfect, like all human inventions at first. They have all been preferred from time immemorial against every new departure of human invention and progress. They are impotent and futile against the accomplished fact. It is the old story of the Northern farmer's protest against the steam-plough "huzzin' an' maäzin' the blessed feälds

wi' the Divil's oän teäm." For "fields" read "roads," and we have the motor-car in the prophetic vision of this sturdy *laudator temporis acti*. But the motor-car will survive as the steam-plough has survived, and its opponents will sooner or later have to content themselves with the goodly company of the Northern farmers and the Mrs. Partingtons of the past. For good or for evil, it will largely modify our social life. It will greatly extend the radius of action, so to speak, of every one who can afford to keep a carriage. It will bring Brighton within a day's drive from London, and even Cromer, say, within the limits of a week-end excursion by road. It will largely affect the suburban traffic of our railways within a radius of at least thirty miles. It will greatly improve the delivery of goods and parcels in the country. It may even some day be generally adopted by the Post Office, though that cautious and conservative department professes itself as yet to be unable to find a motor-car suited to its needs. We shall see our roads busy again, busier, perhaps, than they ever were in the old posting-days, and instead of post-horses the cry will be for petrol. There will be less poetry and less romance about the whole thing, but there will be a good deal more public convenience and

"*Laudator temporis acti.*"

Roads busy again.

not a little public economy. Finally, when the motor-car is in its turn displaced and we all navigate the air, the *laudator temporis acti* will still be with us, and will raise once more his pathetic lament over the disappearance of the picturesque and humdrum old motor.

Nevertheless, there are certain important questions of public policy and public convenience which are raised in a very acute form by the advent and sudden popularity of the motor-car. The motor-car uses the public highway, and its owner or driver, like every other person who uses the highway, is subject to certain general conditions which limit his freedom of action. The right of all persons using the highway is equal and co-ordinate.

Roads for the use of all.

No man can so exercise the common right of user as to prejudice or impair the equal and co-ordinate right of others. This general principle at once raises the whole question of speed in general, and the associated question of the bearing of high speed on the rights of other persons entitled to use the highway. "Furious driving" is forbidden by statute and restrained by penalties, and it is defined in the Highway Act of 1835 as "driving any sort of carriage . . . so as to endanger the life or limb of any passenger."

It might have been as well, perhaps, if the

law had been content to apply this broad general principle to the motor-car, without attempting to fix any specific limit of speed. What would be furious driving in a narrow and crowded thoroughfare like Cheapside need not, and in default of specific statutory restriction obviously would not, be furious driving on a broad highway in the country unencumbered by other traffic. Five miles an hour might be excessive in Cheapside, fifty miles an hour need not be excessive on Salisbury Plain. But in 1896 Parliament attempted, rather prematurely and not very happily, perhaps, to regulate the traffic of motor-cars, which were then scarcely known in this country, and were subject to all the restrictions originally imposed on traction-engines. The Locomotives on Highways Act of 1896 enacted that "no light locomotive shall travel along a public highway at a greater speed than fourteen miles an hour, or than any less speed that may be prescribed by regulations of the Local Government Board." The regulations framed by the Local Government Board in pursuance of this Act prescribed, first, that the owner or driver of a light locomotive shall not drive it "at any speed greater than is reasonable and proper, having regard to the traffic on the highway, or so as to endanger the life or limb of any person, or to the

What is "furious driving?"

common danger of passengers "; and, secondly, that "he shall not under any circumstances drive it at a greater speed than twelve miles an hour." In our judgment it would have been much better if the first regulation had not been qualified by the second, nor even by the maximum speed of fourteen miles prescribed by the Act itself.

The prohibition of furious driving really meets all the necessities of the case. The question of what is furious driving should be a question of fact and of evidence, and should be determined by the circumstances of the case. It is notorious that no owner or driver of a motor-car habitually restricts himself to the statutory limit, still less to the Board of Trade limit. It is useless to expect that he should, nor can he be compelled to do so by any measure less drastic than that of prohibiting the use on highways of any motor-car capable of exceeding the prescribed limit—a measure which would practically kill a very flourishing industry, and practically deprive this country of advantages which are very largely enjoyed and appreciated abroad.

On the other hand, the removal of the speed limit would necessarily involve a much more stringent application of the prohibition of furious driving. This is the real reason to be combated, and it is by no means easy to deal with it. How

is a motor-car which is driving furiously to be stopped and brought to book? Its occupants are nowadays as often as not entire strangers to the locality in which their offence is committed, and cannot therefore be identified. Still less can their vehicle be identified out of the scores that now daily pass along any popular line of route.

Possibly good sense and good feeling and the growth of a healthy public opinion on the subject will in time abate an evil of which many persons are beginning not unreasonably to complain. There must be give and take in the matter. If motor-cars are to be allowed to drive at any pace they please, the privilege can only be granted and enjoyed subject to a liberal regard for the public safety and the general convenience of the highway. If owners and drivers cannot be induced to act in this spirit, it must sooner or later be a question whether all motor-cars should not be required to carry a registered number conspicuously displayed in such a manner as to enable the guardians of public order and the public safety to identify them. Such a measure is, we believe, already contemplated in France, where, as Sir Edmund Monson tells us, the motor-car is specially rampant and aggressive.

Sir Edmund Monson's letter is peculiarly

interesting on another account. It tells us that horses in France have already ceased to take any notice of motor-cars, even when furiously driven. That is also the case to a very large extent in London. The horse is a creature of habit, and acquires new habits very readily, when judiciously and gently treated. The horse recommended to Mr. Pickwick was warranted not to shy "if he was to meet a vaggin-load of monkeys with their tails burnt off," and sooner or later all horses will earn a similar warranty in respect of motor-cars. But we would invite all owners and drivers of motor-cars to resort to sensible, kindly, and urbane procedure with timid and nervous horses, which Sir Henry Thompson recommended in the letter we printed last week. It is little to the point to say that owners of horses owe it to owners of motor-cars to accustom their horses to the new terror of the highways. They must do so in their own interest as soon as they can, even if they did not do so out of regard for the common courtesy of the road. But such courtesy must be reciprocal. The owner of a motor-car has no right whatever to assume that every horse he meets on his journey has already been "salted" to the motor-car; and we must congratulate a correspondent who addressed us on Monday on the

Horse and
motor.

quaint humour of his suggestion, "that it is neither the motor-car nor its driver that ought to be certified as safe, but the horse," and that "owners should be made liable for any damage that such animals occasion." This is putting the car before the horse with a vengeance, and, if we could take our correspondent seriously, we could only say that it is an intolerant and inconsiderate spirit like this which is responsible for nearly all the unpopularity and dislike which motor-cars have aroused in many quarters not otherwise prejudiced against them. There is only one thing for the owner or driver of a motor-car to do when he meets a nervous horse or a nervous driver who indicates by a suitable gesture that his horse is not to be trusted. He must act as Sir Henry Thompson bids him, or, at any rate, he must so act as to reduce the risk of accident to a minimum, and to show, by preventing unnecessary alarm, that he understands and respects the courtesy of the road. If he takes no notice, he is no gentleman, and is probably a law-breaker to boot. We are sorry to say, from personal experience, as well as from the testimony of our correspondents, that the number of owners and drivers of motor-cars who are not gentlemen, who show little respect for the law and none whatever for the courtesy of the road, would seem to be

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unduly large. There is no turning a cad into a gentleman, but there is such a thing as making even cads fear the law.

The Times, Sept. 21, 1901.

LETTER III.

MOTOR-CARS AND HORSES

To the Editor of *The Times*.

SIR,—If you and your readers are not already quite satiated with letters on this subject, I shall venture to relate very briefly an incident I recently met with, which appears to me to afford a practical lesson worth recording.

I was driving through a somewhat narrow road in a country district near Chesham, Bucks, when a man, leading a young horse with a halter or bridle only, came out from a stable-yard directly in front of me, and seeing the motor instantly turned about and disappeared.

My driver stopped at once, and I
How to break jumped down and followed the man
in a horse. and his horse into the yard, when he said, "This is a young horse I am breaking in, and he has never seen a motor in his life." Upon which I replied, "Will not this be a good opportunity for him to make its acquaintance quietly, and not have to do so for the first time

when he is in harness, and probably smarting under the whip and tightened reins of his driver, according to the usual custom ?" He answered very sensibly, "Certainly, and I shall be very glad if you will be good enough to let me bring him out and let him see it." The engines were stopped and the horse was led, walking quietly enough round the machine, and again also when the engines were going, and so obtained his first impressions under favourable conditions. My new friend the horse-breaker was extremely pleased and thanked me for the opportunity.

Now it strikes me very strongly that early familiarity of the young horse with a motor should be assured by a few lessons of this kind as part of that early education which all, and especially well-bred, animals receive during the process of what is called "horse-breaking," so that at the end of it he may be warranted "quiet to motors."

I am, Sir, your obedient Servant,

HENRY THOMPSON.

WIMPOLE STREET, *Sept.* 18.

* * * *

The First subject I shall now consider is, the speed at which motor-cars should be driven, whatever their power ; (a) in the streets of more or less populous towns ; (b) on the ordinary roads of the country.

(a) It is manifest that the state of the traffic and the obstructions thus, and **Motoring in towns.** in other ways occasioned, must decide the rate, and that no absolute rule can be laid down as to pace. Constant care should be taken against the temptation to endeavour to pass vehicles in front ; a good driver will remain behind until he can see in the stream of vehicles approaching on the right a sufficient opening and ample space for doing so. Constant watchfulness relative to thoughtless foot-passengers, children, frightened horses and drivers, &c., by giving frequent notice by the horn, must be the habit of every good driver. On the other hand, the public are, perhaps, scarcely aware that the motor is far more completely under the control of its driver than any carriage drawn by horses can be. He can stop instantly, if need be, even when going rapidly, by

adopting the following rules. Seated, as he invariably is, with both heels **How the motor is controlled.** planted firmly on the floor below him, the forepart of each foot resting upon the two pedals there, the left known as "the clutch," the right as "the brake," he instantly presses first on the former, which cuts off the power, then immediately afterwards on the latter, which applies the ordinary brake ; while his right hand is at liberty to apply the handle of the big brake at his side if necessary. These three actions take place, with a practised driver, literally in the course of a second. Thus, if a boy rashly ran across the road in front of the motor—as boys sometimes do—and happened to slip down, he would not be run over by a careful and practised driver. Even without the last-named brake, a motor will not move in advance more than a few inches in the act of "pulling up"!—an accomplishment wholly impossible with the best-trained horses. The movements of the car, moreover, are governed by one brain only, while those of the horse-driven vehicle are subject

to the influence of two or several brains—viz., those of the animals driven, besides that of the driver, often in conflict with each other. The motor-car is governed by an autocrat, one who more or less knows his business ; a carriage and horses are mostly managed as by a president and committee of often uncongenial individuals.

(b) Thus much being premised in relation to travel through streets, the rate of speed on open roads will be considered. The **Speed on country roads.** motor traveller should be supplied with road maps : those of Stanford, Cockspur Street, S.W., mounted on cloth, from the "New Ordnance Survey," on the scale of a mile to the inch, which show the high roads, the by-roads, and the railways clearly. It should not be forgotten that the quality of the road is a matter of the first importance to the motor-driver. It is often well worth making some *détour* to follow the route of the good well-managed roads, instead of seeking nearer cuts through narrow and neglected lanes, where barely space enough exists for two vehicles abreast, and meeting

or passing can only be accomplished where a side gate into a field, or cross roads provide sufficient space—either of which opportunities is sure to be met with occasionally. In the country it is sometimes necessary to use these lanes, but my rule on finding myself in a narrow road is to get out of it as quickly as I can, to go slowly at any sharp turn, and give ample notice of approach with the horn.

Now, on any good turnpike-road which is fairly straight, so that one can see ahead from a third to half a mile or more, and very little traffic is about, there is no reason why we should not travel very rapidly, without the slightest risk, say twenty miles an hour. I have permitted myself to approach that, at all events, sometimes. I have already stated in one of the preceding letters that on good roads I always travelled fifteen or sixteen miles an hour—or a mile in four minutes—and sometimes a little faster, such as a mile in three and a half or three and a quarter minutes—three minutes a mile being, of course, twenty miles an hour. Of any speed

beyond the last named I have had no experience at present.

One of the finest roads in England is that known as "Watling Street," originally made by the Romans. It commenced at Dover, passed through Canterbury and Rochester, then onwards to London, where its course is traced by a well-known street in the City bearing that name, then through Buckinghamshire to the north, where it has been kept in admirable condition, *via* Warwickshire to Chester and York, afterwards dividing, to pursue its way onwards to Carlisle on the left and to the Roman wall in the opposite direction.

The "Old Bath Road." Another fine route is the "Old Bath Road," leaving London at Hyde Park Corner, passing through Brentford, Hounslow, Reading, Marlborough, Devizes to Bath, about 110 miles.* For the most part these roads deviate as little as possible from a straight course, and in places there

* For full information respecting these and many other routes, see List of Routes at the end of the work.

are long, not steep, ascents and descents. Let me remark that in descending these the driver can stop his engines, and allow the car to run down the incline solely by its own weight and almost without any noise. If there be a corresponding rise of the road immediately before him, he should start his engines about 150 yards or thereabouts before reaching the bottom, so as to carry him far up the next ascent by the momentum thus acquired, and leave less to be accomplished by the necessary process of lowering speed in order to gain power. The gearings in motors of moderate size are four in number (*vide* p. 23). This is necessarily different in the more powerful cars of 12 or 16 H.P., or in those used for racing purposes; a practice, by the way, which can never be permitted to take place on the public roads in this country.

I now proceed to discuss a troublesome subject, viz., the legal rate of speed. **Legal speed.** It is fixed by authority at present at "twelve miles an hour," and in dealing with it judicially, all the evidence required against

the motorist is the assertion by one or two policemen before a local magistrate that the alleged offender had exceeded that rate during any very brief period of his course, which renders him liable to a very heavy fine and costs. Now, although I have never been summoned or even warned by any policeman—and I must admit that, although it is often notoriously difficult to find one of these useful servants of the public when wanted on ordinary occasions, they are very much in earnest and greatly interested in this particular branch of their duty, and some of my personal friends who are motor-car owners have not been so fortunate as myself, but have suffered severely. The usual system of obtaining evidence against the suspected motor-drivers is this. A known spot on any given road is selected, which from
How rapid drivers are trapped. observation has been regarded as a likely one for them to drive at a more than usually rapid pace, and a portion of this in length, say about 150 or 200 yards, is measured, and a detective is at each end of it. By means of a stop-watch—some-

times only of an ordinary watch—the rate of travel over a hundred yards of road is declared to be at a rate exceeding twelve miles, and sworn to be sixteen, twenty, or more miles an hour. I have observed records in the weekly journals* of several instances of heavy fines obtained from men who passed through this trap—for a veritable trap it is—into which the unfortunate victim has fallen.

Let me advise my reader—quite confidentially, of course—if he ever becomes such a victim, to do as I would if placed in the position described. Attend, of course, personally to the summons and defend yourself; take no lawyer; the question is not one of Law but of Fact. When the constables have made their allegations, and have stated how many yards your motor covered during the distance, from which they deduced by calculation the rate of travel per mile they have sworn to, you may cross-examine. Thus, if there **How to cross-examine.** be any ground for it, inquire first

* *The Autocar and the Motor-car Journal.*

whether they can state that any life was in the least degree endangered by your driving, whether you neglected to provide against the presence of children, or even animals likely to be run over. If neither of these circumstances is alleged, ask whether the spot they selected was a short descent in the road which you ran down quickly to carry you up the next ascent, in which case the high speed would therefore be defensible (*vide* p. 41). If this were not the case, simply demand whether the charge against you rests upon the calculation resulting from the employment of the stop-watch. This will, of course, be assented to. Reply politely that you desire to know the name of the watchmaker, and will they be good enough to produce the watch? On their doing so, you will find it is not made by an English maker, but that it is a cheap foreign watch, probably Swiss; if so, it is wholly untrustworthy for racing purposes, such a one never being employed to determine the speed of a man, a horse, a motor, or even of a cycle race. The

police have no others ; for the stop-watches which are alone depended upon for any of the above-named purposes have been made by makers of repute, and are far too costly to supply to the police force. It would be very easy to obtain and produce one of the latter to show the difference. I think any magistrate would hesitate—when the above-named facts are pointed out—about deciding against you, unless the charge was proved by an instrument guaranteed as the work of a well-known English watchmaker.

First quality
stop-watch
alone suitable

But it is quite clear that some change must be made in the law. Twelve miles in the hour is a ridiculous limit to impose on the motor-driver. A pair of good horses in a light carriage will do that easily on a good open country road, and often more, as I have myself observed when a nervous Jehu desires to get out of reach of the dreaded motor, whose approach he hears behind him. I have seen horses, and even fast ponies, driven fully fifteen and sixteen miles an hour under these circum-

No speed limit
for horses.

stances. The well-known American hickory-built machines, with four large wheels of equal size, and a seat for the driver in the middle, for their famous trotting-horses, of which a special breed has long been cultivated, are by no means unfrequently seen on our roads; and the record of their performances is well known. The pace far surpasses any that is permitted to motor-cars. Not only in America but in England many trotting matches have issued in the performance of a mile in $2\frac{1}{2}$ minutes. But on common roads an American trotting horse is a formidable antagonist for a motor-car driven say at 16 or 18 miles an hour. Yet, who has ever heard of any penalty inflicted on an American driver here? At the ridiculous pace of 12 miles an hour the motor is passed by any good trotting horse attached to a light dog-cart, as I have known to my cost, in localities where the police are known to be particularly hostile to the former. An Act already exists to inflict penalties for "furious driving," and what that is must depend on circumstances, equally in the

cases of horses or motors. As *The Times* has well said: "The prohibition of furious driving really meets all the necessities of the case. The question of what is furious driving should be a question of fact and of evidence, and should be determined by the circumstances of the case. It is notorious that no owner or driver of a motor-car habitually restricts himself to the statutory limit, still less to the Board of Trade limit."

The pace of a motor on an open country road may certainly be safely permitted to reach twenty miles an hour, and cannot be regarded as "furious." It ^{Twenty miles an hour.} seems now to be quite forgotten that steam-coaches were driven with perfect safety at fully twenty miles an hour on good and open roads in the former half of the last century. Of course, if there is much traffic on the route, and also when passing through small towns and villages, this pace is out of the question, the "High Street," as it is usually called, often teeming with children and local vehicles. Moreover, no kind of racing or rivalry between the

drivers of motor-cars casually passing along the same route should take place : a 10 H.P. will naturally pass one of 6 H.P., and a 15 H.P. will pass both, but all must conform to the same rate of speed if a precise legal limit continues to be imposed. Every driver of experience can judge at a glance the horse-power of any motor within view, and is perfectly aware which can travel at the greatest rate.

An excellent article on the subject of the difficulties which exist in regulating the control which it is desirable to maintain over the motor-cars, and at the same time to secure the rights and the safety of the public, appeared in the *Spectator* of July 6, 1901. From this I shall make a few extracts by the kind permission of the Editor :

“What has to be considered here is the best way of exercising control over motor-cars without destroying the motor industry and depriving the owners of motor-cars of their fair rights in regard to the use of the roads. Though the majority of motor-car drivers use all proper care in the management of their vehicles, it is no doubt true that in a

The
“Spectator”
on motors.

certain number of cases a good deal of recklessness is displayed. Cars are driven fast where they ought to be driven slow, and occasionally insufficient care is taken to consult the convenience and safety of the general public. But this occasional misconduct on the part of reckless and ill-conditioned drivers of motor-cars has been enormously exaggerated by the prejudice which opposes the use of motor-cars as of all new inventions. While the careless and reckless driving of horses passes without notice, dangerous driving on the part of the 'motorist'—to use a barbarous expression—is at once made the subject of comment. Yet in truth there is often far greater danger from the vehicle drawn by horses than from the horseless vehicle. And for a very simple reason. It is far easier to stop a motor-car at a moment's notice than a horse. When a child runs suddenly across a road, a motor-car can be brought to a stand before any injury is done much more rapidly than a fast-trotting horse. You cannot apply an 'instant' brake to a horse's legs. The proof of this fact is to be found in the very small number of persons actually run over by motor-cars, making allowance, of course, for the number of vehicles. Even in France, where the pace allowed to motor-cars is much greater than here, and where their number is enormously

greater, the accidents due to motor-cars are, we believe, much fewer than those due to bicycles. . . .

“In our opinion, the true way to prevent reckless driving and to keep due control over motor-cars is to provide that no car capable of high speed should be allowed to use the roads except when in charge of a driver who holds a certificate that he is competent to manage and drive the machine. It might, we hold, be reasonably enacted that every car capable of going more than, say, fifteen miles an hour on the level should be under the control of a certificated driver. For any minor breach of the law the certificate should be liable to endorsement by a magistrate, and in the case of any accident where carelessness, or criminal negligence, or recklessness could be proved, the certificate should be liable to suspension for three months, six months, or a year, as the case might warrant. In very bad cases the certificate might be forfeited altogether. This liability would make the holders of certificates extremely careful to avoid accidents. If any accident occurred when they were exceeding the legal limits of speed, they would know that they could not plead contributory negligence, and that their certificates would be in danger. The professional driver would feel his livelihood

was at stake, while the amateur would be extremely anxious not to be deprived of the right to indulge in his pastime. At the same time that the certificate was granted the driver might undertake not to drive any car that was not fitted with a sufficiency of brakes, &c."

Some remarks from M. Fournier, a high authority in France, coincide with the foregoing suggestions in stating that "the French system insists upon all motor-drivers obtaining a certificate of competency in driving from the authorities. I urge that no one is permitted to run a motor-car until his ability has been certified by a competent Government expert." *

The French system.

It is a question, perhaps, whether a driver who has a good certificate should be exposed to the risk of having it endorsed for an alleged slight fault of which an unduly active policeman may accuse him to any country magistrate before whom he may happen to be summoned. The driver is almost always unable to bring a witness, and his chances are small in the hands of those who live by

* A Report I copied verbatim from a recent number of the *Motor Journal*, of which I neglected to note the date.

bringing alleged transgressions into court. Such a punishment ought, no doubt, to be inflicted for drunkenness, or for gross negligence, if proved. In most of the smaller complaints a warning ought to suffice, with the intimation that a second or third complaint would probably lead to endorsement. For a written imputation on a driver's character for ability or care would ruin his future prospects. No one would engage a man with a certificate affirming carelessness or inefficiency.

I propose to offer here a brief sketch of the three varieties of motor-cars now in use, viz. :

I. That driven by Petrol; II., by Steam; and III. by Electricity. And I may
**Varieties of
motors.** here appropriately mention the fact that no motor could be driven on common roads until the end of the year 1896. Up to that date every vehicle bearing that name was a heavy steam-roller employed in road-making, and it was also compulsory that a red flag should be carried before it to announce the fact to all drivers and riders

of horses to whom these machines were naturally a source of alarm. The Right Honble. Henry Chaplin, President of the Local Government Board, brought in a Bill entitled "The Locomotives on Highways Act," and which was passed November 14, 1896, permitting the new motors to traverse all common roads, and limiting the rate on their first appearance to fourteen miles an hour, a pace which was soon after altered by the Board to twelve miles an hour.

I. THE MOTOR DRIVEN BY PETROL.*

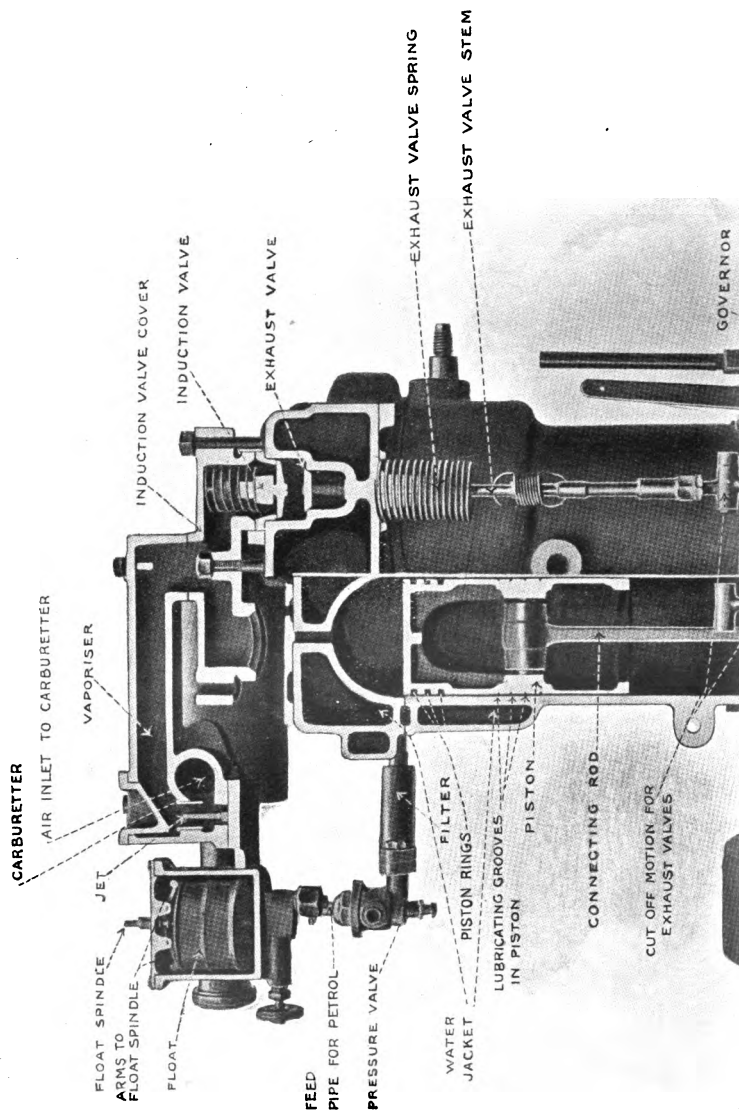
The engine thus described, and at the present time most generally employed, obtains its force by the combustion of **Petrol motors.** petrol, and by adapting and controlling it for locomotive purposes. The principle of its action resembles that adopted in a stationary gas-engine, viz., by the expansion of heated air and vapour, but produced in this case by the

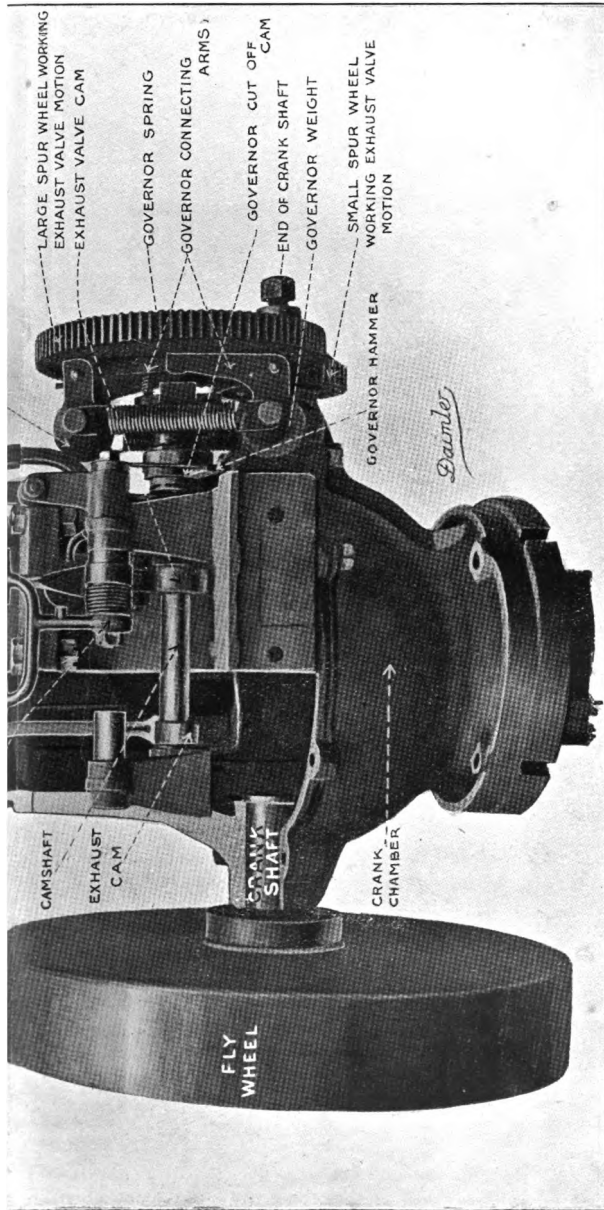
* Petrol, or petroleum, is a natural product, known also as "mineral oil," because found in large quantities in certain rocks. It consists of hydrogen and carbon, and is highly inflammable.

combustion of a small quantity of petrol within the upper part of the cylinder placed in a vertical position, with a piston and rod furnished with a fly-wheel and governor, the vertical being converted into a rotary action by a crank and connecting-rod in the usual manner.

In the motor described the liquid petrol is supplied from a small reservoir or "float-chamber" above the level of the cylinder, the upper part being about level with the driver's foot (see Plate II.), the whole covered by a light metal cover in the front of the car and termed "the bonnet," which, when opened by its hinges, shows the cylinders and the allied machinery. The store of petrol for a journey of 120 miles (about six gallons ; with electric ignition it is about five and a half) is contained in a tank below the body of the car and just behind the driver. Before starting, the driver forces, by means of a small hand-pump which lies upon the carburetter-box before him, some petrol into the float chamber, until about 4 lb. or 5 lb. pressure to the square inch is produced. A pressure gauge, formed







THIS ILLUSTRATION SHOWS BOTH THE EXTERNAL AND INTERNAL WORKING PARTS OF A 6½ HORSE-POWER DAIMLER MOTOR HAVING TWO CYLINDERS. THE CYLINDER ON THE RIGHT HAND IS COMPLETE AND SHOWS ONLY THE EXTERIOR; THAT ON THE LEFT-HAND IS REPRESENTED IN SECTION AND SHOWS THE PISTON AND OTHER INTERNAL PARTS. FOR FURTHER DESCRIPTION SEE PAGES 53—57.

with a small dial and an indicating finger, is attached to the dashboard, and shows the amount of pressure at any instant, and this pressure is afterwards sustained by the action of the engines so long as they are at work. Meantime, in its passage to the burner, the petrol passes through a filter of very fine wire gauze, which frees the liquid from any impurities it may contain.

The burner having been warmed with a little naphtha, the petrol is vaporised **Tube ignition.**

before it issues from the burner, so that the platinum "ignition tube" is brought to a white heat by the flame beneath it, and the machine is set in motion by the starting handle. As the piston descends it draws from an opening near the top of the cylinder a small quantity of petrol in the form of spray, which is vaporised and exploded by the heat from the platinum tube and mixed with heated air, forming what is known as "carburetted air" or "the charge." Thus, the piston is forced down, causing the fly-wheel to make half a revolution. The next half-revolution raising the

piston causes the contents of the cylinder to be compressed into a small portion of space, increasing the pressure to about 45 lb. to the square inch. This compression forces some of the mixture into the ignition tube, and the highest temperature and greatest force is then exerted, driving the piston to the bottom of the cylinder. The fourth half-revolution of the wheel carries the piston to the top, and the products of combustion are ejected, an effect known as "the exhaust." The two revolutions are equivalent to one effective or "working" stroke; there are 720 revolutions in a minute, or 360 working strokes.*

I owe to the courtesy of the Daimler Motor Company, Limited, of Shaftesbury Avenue, permission to copy an admirable engraving illustrating completely this and

* I am indebted for the description given above to the comprehensive, elaborate and fully illustrated work, "Motor Vehicles and Motors, their Design, Construction, &c." By W. Worby Beaumont, Mem. Inst. Civ. Engineers, &c. &c., pp. 66-69, with an excellent plate and ample references thereto. Archibald Constable & Co., Westminster, 1900.

many other points well worthy of study in tracing the action of the engines which drive the class of motor-car now under consideration. (See Plate II.)

The foregoing description represents that which is technically known as "tube ignition." It is perhaps the simplest mode—*i.e.*, the least complicated one for the ordinary driver.

A comparatively modern improvement is that of exploding the petrol, not by the platinum heated to a white heat by the petrol flame itself, but by an ^{Electric} ignition. electric spark from an induction coil inside a small box attached to the dashboard in front of the left-hand seat next to that of the driver, and is technically known as "electric ignition." The battery itself, which is in contact with it, consists of four connected dry batteries in a large box well covered with pieces of thick felt, and usually, but not always, placed under the driver's seat. The advantages claimed for this method are as follows : With petrol alone the flame is apt to be blown out in

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windy weather, an accident which cannot occur with the electric spark, as it takes place within the cylinder itself, and is, therefore, not exposed to currents of air; in which circumstances the petrol vapour might escape in some quantity, become ignited and produce a fire. Moreover, if an accident to the motor occurs through collision or upsetting, some of the fluid petrol will almost certainly escape, take fire, and the machine may be burned; a dangerous, although rare, accident which nevertheless sometimes takes place, but one which is not possible with electric ignition.* Moreover, it economises the consumption of petrol considerably; I have found to the extent of 10 per cent. Lastly, it gives the driver the power of varying the speed of his motor so that it results in less wear and tear of the machinery than occurs with simple "tube ignition."

The following directions apply more or

* A case of this kind recently occurred, and the fire was extinguished by the fire-engine of the town, but not before great injury had been done to the motor.

less to the management of all motor-cars, although more especially to those driven by petrol, and may, therefore, appropriately follow here.

A fine lubricating oil, sold by the gallon, is stored in a brass reservoir under "the bonnet," and is forced by pressure ^{Motor management.} into the lubricators arranged along the top of the dash-board in front of the driver, to the left of the dial or "pressure-gauge" belonging to the petrol supply (see p. 55). Each lubricator consists of a glass tube having a flat metal head with a milled edge. Of these there may be three, six, or more, according to the H.P. of the motor (mine has three). Of these three, the two on the right supply oil, one to each of the two engines; the remaining one supplies it for the same purpose to the crank chamber.

A very thick kind of grease is employed for a like purpose to the series of gearing wheels which are contained in a large case below and behind the driving-seat in the fore part of the body of the machine (*vide*

Plate III. and description). This is covered in and lined with aluminium to protect the wheels from dust or mud, the weight of the gearing apparatus, which is considerable, being supported on the under frame of the carriage; and the whole rests on elliptical springs on the wheel-frame of the carriage below.

The cooling apparatus is placed behind the carriage, projecting below it, and consists of a series—forty or fifty feet—of small tubes surrounded with thin ribs of aluminium, so as to offer a large surface to the air as the water passes rapidly through it. The circulation of the water, which becomes heated in the jackets of the cylinders, is accomplished by means of a pump worked by the engine, which maintains continuity of movement throughout its course; and is driven back cooled to repeat its function in the cylinder-jackets as before.

The accelerator is a small handle working upwards and downwards in notches on the ratchet principle. It projects from the

base of the dash-board immediately in front of the driver's feet. It accelerates the pace when moved upwards by making the revolutions of the engine more rapid—*i.e.*, instead of the usual 720 in a minute, to 800 or 900 or more: while by depressing the handle it diminishes the number, and "slows down" the pace or entirely stops the car.

I may add that all motors up to those of 9 H.P. are furnished with two separate cylinders. More powerful motors, whether of 12, 16, 20 or more H.P., generally have four cylinders; the very large ones having cylinders of slightly increased diameter and length.

II. MOTORS DRIVEN BY STEAM.

Steam-motors. Steam-motors made their appearance at a very early period. Walter Hancock was the first in this country to make experiments with the view of using them on common roads, and did so in 1824, gradually improving them, so that in 1834 a regular service of omnibuses was organised between the City and Paddington, travelling at about the rate of ten miles an hour. I myself saw them in that year running down the City Road. G. Gurney closely followed, and constructed stage-coaches capable of climbing a steep hill. These two were the chief originators, among others of less note, of the numerous and powerful road-steamers and traction-engines used at the present day.*

Within the last nine or ten years the Serpollet system, named after its originator, came into much vogue in France. It in-

* W. Worby Beaumont's work before referred to, chap. i. pp. 4-41, with numerous illustrations.

cluded a tubular boiler by means of which steam was very rapidly generated, and by this method much better results were obtained than those of any previously existing steam motor.* Of late the Americans have succeeded in producing some very light and handy steam-carriages to hold two persons only. They are of simple construction, and carry fifteen gallons of water, which suffices for a run of 20-25 miles. This quantity requires rather more than a gallon of petrol to heat it, and the boilers are also of the tubular type.† I have seen them occasionally passing through Hyde Park, in London, and sometimes driven by ladies.

III. THE MOTOR DRIVEN BY ELECTRICITY.

It is not possible to regard the question of how best to employ this **Electric motors.** agent for the purpose of motor power, as it is not by any means solved at present. We

* For full particulars respecting them, *vide* W. W. Beaumont's work, pp. 457 *et seq.*, fully illustrated.

† *Op. cit.*, pp. 444-56, with numerous illustrations.

all remember, and doubtless occasionally indulged in a trial of the electrically propelled cabs which were to be seen in the streets of London in 1898-99, and many regretted that the enterprise which produced them proved to be financially unsuccessful. The fact is, the weight of the secondary or storage batteries which must be carried does not permit them to be employed for any but short distances and on good roads; and unless one could rely on finding a source of electricity from which to recharge, at every town of any importance—and this at present I fear is not the case—no long journey could be attempted. No doubt improvement will take place, and I think we are warranted in hoping and, indeed, in expecting, thanks to the progress which scientific research is constantly achieving, that electrical force will some day supersede all the petrol and steam-driven motors.

Since writing the above I have learned, on what I believe to be good authority, that the well-known Mr. Thos. Edison, of America, has invented, or is seeing his way to solve

the question of providing, a storage battery which overcomes to a great extent the defects noted above.

Several allusions have already been made to the character and the ac-quirements of motor-car drivers. I will now state here in detail what I regard as the qualifications which a first-class driver should possess :

Qualifications
of a driver.

1. He must be strictly sober in his habits.
2. He must have acquired the power of giving constant and undivided attention to the road and to traffic of all kinds.
3. He should cultivate a courteous readiness to diminish pace and noise by cutting off power at once when he sees occasion, as on meeting restive horses, and especially when ladies are driving or riding animals which are evidently frightened.
4. He must be acquainted with all the internal mechanism of his motor, and know how to replace movable parts which accidentally give way when travelling. He should be supplied with these, and keep them, with a set of necessary tools of various

kinds, in the spaces provided for the purpose beneath the floor of the front seat. He is also provided with the following list of articles suitable for the petrol-driven motor described as well as for one in which the petrol is exploded by electric ignition :

1 induction valve ; 1 exhaust valve ; 1 float jet ; 1 set of springs for engine ;
The accessories 1 platinum ignition tube ; 1 sheet of
necessary. asbestos ; 1 sheet of fibre ; 1 burner spanner ; 2 doz. assorted bolts and nuts ; 1 adjustable spanner ; 3 doz. assorted split pins ; 2 sparking plugs ; 1 coil of copper wire ; 3 feet high-tension electrical wire ; 2 spare burners ; some resin ; a little store of methylated spirit to heat the burners at first starting ; a volt and ampère meter, to measure the stock of electric energy remaining in the battery. For other types of motors this list would have to be varied.

Many very serious difficulties may be avoided when at a distance from home by having the above-named materials always within reach.

One more suggestion should be men-

tioned, viz., that if in winter there is any fear of the water employed for cooling the cylinder jacket, which is kept in the tank at the back of the vehicle, becoming frozen, it should be drawn off after use, to prevent the injury which would in that case occur.

The condition of the Roads throughout the country is a subject of great importance to the entire community. **Good and bad roads.** Owing partly, perhaps, to the introduction of railways, some of the former have fallen into a state of partial neglect. The cost of maintaining them in a thoroughly sound state as regards FORM and SOLIDITY, so as to insure easy transit for the public at large, would be amply repaid by a considerable outlay for this purpose: a fact which is, or ought to be, well known. It would effect a considerable economy to the country in the long run to maintain its chief roads in first-rate condition, the existence of bad roads being equivalent to a heavy tax on the population, from which localities are exempt where the means of communication are good and ample.

(A) **FORM:** The contour of a well-made road should be slightly convex from side to side ; say, of no more than a rise of one in forty from either to the centre, so as to insure the prompt removal of all water to an outer ditch by drains passing thereto, beneath the lateral raised footpath on each side.

(B) **SOLIDITY:** In order to avoid as far as possible the formation of holes situated mostly about the centre of the road itself.* These are caused chiefly by the iron shoes of horses, which grasp with great force the surface in the act of drawing heavy loads, especially when ascending a hill, making hollows in it, in which water lodging produces a condition known as "rotten," through percolation to the material below. The narrow wheels, also, of the ordinary horse-driven carriage have a tendency to produce a similar effect. In most country

* The two chief authorities on modern road-making were Macadam—hence the term "macadamised"—and Telford the engineer, who flourished in the early part of the last century. The former commenced his operations about 1803, the latter about 1816.

places the roads are "mended," as the phrase goes, by laying upon the loose portions described a quantity of rather coarsely broken stones over the surface, without any heavy machine-roller to incorporate them with the road and produce a level surface, in the manner always practised on the high roads. The process is left to be performed by the uncertain chances of the ordinary wheel-traffic; and a very slow and very rude one it is.

One of by no means the least of the advantages which the motor-car possesses over horse-driven conveyances is the invariably great breadth of its wheels, which act as rollers on the road-surface instead of cutting into it; besides the important one of having no iron horseshoes by which to injure it in the way described. The line of the motor's track leaves an improved condition of the surface of the road, as I have often observed. Were all vehicles automobile—as at no very distant period they may be—what excellent roads the country would possess!

The motor as
road-protector.

The motor as sanitary reformer. More important still, the sanitary condition of our great city would be considerably improved, since the streets would no longer be, as they

are now, the daily receptacles of many tons of manure which become not merely offensive, but prejudicial to health. Its components soak into the wood pavement and pollute the surrounding air by evaporation; and in hot and windy weather, with dust also, which is inhaled by the inhabitants. Among the several sources of deterioration which produce the notable difference between the atmosphere of the town and the "pure air of the country," this one in particular is a cause of deranged health to many. It is second in degree, but the same in kind, as that occasioned by the intramural interment of dead bodies, long ago forbidden; since which regulation they have been carried to cemeteries in suburban neighbourhoods, where, owing to the rapidly increasing rate of house-building on every side of London, they will soon become intramural again and a source of grave injury to

the growing populations there. This by the way.

I have referred to the broad wheels which are used for motor-cars; there **Motor tyres.** are two varieties, viz., those with tyres made of solid rubber and the pneumatic tyres. The solid tyre is much less costly than the latter, and of course possesses the advantage of not being liable to puncture; but, on the other hand, it involves more vibration to the rider, and more wear and tear also to the machinery of the car itself. If the roads traversed are invariably good—not roads with tramways to be constantly crossed—solid tyres may be adopted and the vibration avoided by a plan which I have devised for myself, *i.e.*, of being always seated on a good-sized air-cushion, which is fastened **Solid tyres.** closely by small leather loops to metal studs which are screwed into the woodwork at the back of the seat next to the driver. Another cushion is fastened in a similar way to support the back, while I have another below, on which my feet are placed, and by this

means I am perfectly comfortable. My driver has one behind him to surround his back, and it gives him a support which he appreciates.

With pneumatic tyres a puncture is by no means an uncommon occurrence, and is always a troublesome one. First, it is invariably necessary to carry a strong lifting jack attached to the motor below, so as to be prepared for the accident, in order to raise that end of the carriage where the injured

**Pneumatic
tyres.**

wheel is; then to strip off the outer cover, pull out the punctured portion of the air-tube, lifting up as much as is necessary, and apply the rubber solution, just as with a cycle, only on a larger scale. With the car it is an affair of twenty minutes at least. On the whole, however, taking all eventualities into consideration, I think the pneumatic tyres must have the preference.

**Driver's
equipment.**

Certain other points may be briefly mentioned here. The driver's equipment in the matter of clothes should be obtained at some well-known estab-

lishment for the supply of his peculiar wants. It consists of the long leather waterproof coat universally adopted in wintry or wet weather, the interior of the sleeves being rendered impervious to wind and rain by means of an elastic diaphragm which tightly encircles the wrist; the flat waterproof cap; and a pair of waterproof leather gauntlets for driving. In summer a blue-cloth short coat is adopted, buttoned up to chin, and trousers to match. In almost all weather "goggles" are desirable. They vary considerably. In "Goggles." winter they are necessary to protect the eyes from currents of cold air and from the deposits of fog; in summer from the sun's glare, dust, and flies of all kinds, of which the swarms of exceedingly small insects, which are abundantly met with in August and September, are the most irritating and difficult to avoid. For this purpose the mere fine-wire goggles are quite useless. The most effective, perhaps, are full-sized oval, neutral-tint convex glasses, to which are attached white silk surroundings, to

K

cover the cheek closely. These may be much improved in appearance by giving them a tint as near to that of flesh as possible, or by soaking them in a little strong coffee. Ladies can avoid all these troubles by wearing appropriate veils.

Health and the motor. A word or two may be added in relation to the effect of motor-car driving on the health. Personally, I have found that the opportunity it affords for filling the lungs with pure air during some hours daily is a valuable and health-promoting exercise, aerating the blood, and enabling it to eliminate waste matters. Again, the movements of the car itself affect health favourably, in a manner not differing materially from those experienced in riding on horseback. At the same time, it is necessary to recollect that the motor-car affords practically no movements for the legs, and is inferior to saddle exercise in that respect. Some employment for these limbs is necessary. Prolonged runs in the car render the legs cramped and stiff, and opportunities should be found once or

twice during a long journey of, say, 70 or 80 miles, to take a short but smart walk for a few minutes to keep the muscles in order, and make the blood circulate through them. It is almost unnecessary to say that one should never travel, except in perfectly calm and fine summer weather, without the means of avoiding the effects of rain and of catching cold. The ordinary stout, long mackintosh coat, with sleeves like those described above, should be within reach. As a rule, in settled wet weather I don't use the car, but prefer my brougham.

Provide against
bad weather.

I have nothing further to add to the information thus far offered. I do not pretend to advise intending purchasers what maker to patronise, only to tell them my own experience, and to say that I am thus far content with my own choice. As with all other commodities, the best are the cheapest in the end, and this is especially the case with all forms of machinery. Again, the owner of a motor-car, however good, must be prepared to meet with the occasional occurrence of little defects and mis-

The best far
the cheapest.

haps which require it to be sent for a day or two to the maker. A motor is a machine so very much more complicated than an ordinary carriage, that he must not be surprised at this. And, as highly skilled labour is required for the purpose, this is, of course, more costly than that employed for all ordinary repairs by any coachmaker.

It may be useful to some readers to state that the tax on motor-cars is as under :

If the car, without its petrol, water, or dry batteries, weighs under one ton, it pays £2 2s. yearly, and no addition thereto. If, in the same condition, it weighs between one and two tons, it pays an additional duty to the ordinary tax, of £2 2s. yearly.

One of the secondary advantages which a motor-car experience brings to its owner is the increased opportunity for observing both town and country life which it affords, and this by no means an inconsiderable one. There are endless sources of amusement and of information to be enjoyed with the ceaseless panorama unfolded during every mile of the journey, whether in the streets or

amidst rural scenery, for those who use their eyes. A journey with a motor-car is greatly superior to railway travelling in this respect, since the line necessarily avoids the central parts of all the towns, and offers ^{Pleasures of} motor-riding. no opportunity for inspecting old or interesting buildings—cathedrals, churches, castles, and other historic remains—many of which I should never have seen but for my ten weeks trial trip in the three counties named at the outset, and during many subsequent runs. Nor could I have obtained numerous good photographs, as I found in the summer season it was easy to do. Opportunities are offered for observing incidents and facts innumerable. As an example, let me name one here which I could not avoid noting in my autumnal expeditions through a country which has an important relation to agriculture. I was greatly impressed by seeing in the apparently well-cultivated districts of the three counties named large numbers of thistles, a species of weed universally regarded as one of the most objectionable as well as one of the most difficult to eradicate.

Whole colonies of these were flourishing about the hedges and borders of the roads in many places during September, each plant with half a dozen or more of fully developed bunches of "thistle down," that is to say, of seeds prepared for flight as emigrants, scattered by the wind, to seek a fitting home in cultivated land hard by, wherein to take root and multiply after their kind, certain to appear next year among valuable crops. It was painful to feel how easily and certainly the mischief might have been prevented. Why had these plants not been cut down when the seed-vessels were immature and harmless? Prevention is better than cure. A single labourer, armed with a reaping-hook or scythe, might have destroyed millions in a day's work, when the purple blossoms were visible, in June or July, and all this pernicious propagation would have been prevented.

The occupant of a well-driven motor-car, who has leisure to make excursions in fine weather amidst the interesting and beautiful

scenery with which our country abounds, possesses opportunities for appreciating it which his forefathers never possessed or could have imagined. I had passed my eightieth year before I gained my first experience of a motor-car drive, and trust, although a late beginner, I may yet live a year or two longer to enjoy the same pleasure and profit as I have already derived from the practice.

And now it only remains for me to hope that my reader may long and happily realise the prospect which future improvements in locomotion may afford him, and the increased facilities which will arise from the further development of the machine and its capabilities, which will certainly be effected at no distant period of time.

I shall now add a series of Routes for motor-car travel, selecting the best roads, and covering thus the whole of the country as far as to Edinburgh in the North ; to Liverpool and Manchester in the North-west ; to Exeter in the South-west ; and to all the chief places of resort on the shores

of the Channel in the South and South-east round to those of East Anglia, to complete the circuit. There are upwards of twenty principal routes, with several of a shorter character. The names of all the chief towns are recorded in each, and the distance in miles from London marked.

**UPWARDS OF TWENTY
ROUTES FROM LONDON**

**ON THE CHIEF ROADS TO THE MOST
IMPORTANT CITIES AND TOWNS OF
THE KINGDOM**

L

ROUTE I

THE GREAT NORTH ROAD

London to Doncaster and Edinburgh

Finchley	about 8 miles
Barnet	" 12 "
Potter's Bar	" 15 "
Hatfield	" 21 "
Stevenage	" 32 "
Biggleswade	" 45 "
Alconbury Hill	" 69 "
Stamford	" 90 "
Grantham	" 111 "
Newark	" 125 "

(Side Route Newark to
Lincoln, 10 miles)

East Retford	" 145 "
Doncaster	" 163 "

(Side Route to Leeds, 28
miles ; through Selby to
York, 33 miles)

Boroughbridge	" 206 "
Northallerton	" 225 "
Darlington	" 241 "
Durham	" 259 "
Newcastle	" 273 "
Berwick	" 337 "
Edinburgh	" 395 "

ROUTE II

London to Manchester

Finchley	about	8 miles
Barnet	"	12 "
South Mimms	"	15 "
St. Albans	"	21 "
Dunstable	"	34 "
Stony Stratford	"	53 "
Northampton	"	66 "
Market Harborough	"	88 "
Leicester	"	98 "
Loughborough	"	109 "
Derby	"	126 "
Matlock Bath	"	142 "
Buxton	"	164 "
Stockport	"	181 "
Manchester	"	189 "

ROUTE III

London to Coventry

Finchley	about	8 miles
Barnet	"	12 "
South Mimms	"	15 "
St. Albans	"	21 "
Dunstable	"	34 "
Fenny Stratford	"	46 "
Towcester	"	61 "
Daventry	"	73 "
Coventry	"	92 "

ROUTE IV

London to Birmingham and Wolverhampton

Edgware	about 8 miles
Stanmore	" 10 "
Bushey Heath	" 12 "
Bushey	" 13 "
Watford	" 15 "
King's Langley	" 20 "
Berkhampstead	" 26 "
Tring	" 31 "
Aylesbury	" 39 "
Waddesdon	" 44 "
Bicester	" 55 "
Banbury	" 70 "
Gaydon	" 81 "
Warwick	" 90 "
Wroxall	" 96 "
Knowle	" 101 "
Birmingham	" 112 "
Wolverhampton	" 125 "

Alternative Route to Watford

Marble Arch

Harrow	about 11 "
Pinner	" 14 "
Watford	" 17 "

ROUTE V

London to Gloucester and Hereford

Marble Arch

Shepherd's Bush

Acton	about	5 miles
Ealing	"	6 "
Southall	"	9 "
Hillingdon	"	13 "
Uxbridge	"	15 "
Beaconsfield	"	23 "
High Wycombe	"	29 "
Stokenchurch	"	36 "
Wheatley	"	48 "
Oxford	"	54 "
Witney	"	65 "
Junction of Roads	"	74 "
Chalcombe Pitch	"	91 "
Gloucester	"	102 "
Ross	"	117 "
Hereford	"	122 "

ROUTE VI

THE BATH ROAD

London to Bath and Bristol

Hyde Park Corner

Kensington

Brentford about 7 miles

Hounslow " 10 "

Slough " 20 "

(Side Route to Eton and
Windsor, 2 or 3 miles)

Maidenhead Bridge . . . " 26 "

(Side Route to Henley-
on-Thames, 10 miles)

Twyford " 34 "

Reading " 39 "

Newbury " 56 "

Hungerford " 64 "

Marlborough " 74 "

Chippenham " 93 "

Bath " 106 "

Bristol " 118 "

ROUTE VII

London to Exeter and Penzance

Hounslow	.	.	.	about 10 miles
Staines	.	.	.	" 17 "
Egham Hill	.	.	.	" 18 "
Sunningdale	.	.	.	" 23 "
Bagshot	.	.	.	" 26 "
Blackwater	.	.	.	" 31 "
Basingstoke	.	.	.	" 46 "
Oakley	.	.	.	" 50 "
Whitchurch	.	.	.	" 56 "
Andover	.	.	.	" 63 "
Beacon Hill	.	.	.	" 75 "
Stonehenge	.	.	.	" 79 "
Chilmark Bottom	.	.	.	" 92 "
Mere	.	.	.	" 100 "
Wincanton	.	.	.	" 108 "
Ilchester	.	.	.	" 121 "
Ilminster	.	.	.	" 133 "
Honiton	.	.	.	" 151 "
Exeter	.	.	.	" 168 "
Okehampton	.	.	.	" 190 "
Launceston	.	.	.	" 209 "
Bodmin	.	.	.	" 231 "
Truro	.	.	.	" 255 "
Redruth	.	.	.	" 264 "
Hayle	.	.	.	" 274 "
Penzance	.	.	.	" 281 "

M

ROUTE VIII

London to Salisbury and Dorchester

Hyde Park Corner

Kensington

Brentford	.	.	.	about 7 miles
Hounslow	.	.	.	" 10 "
Staines	.	.	.	" 17 "
Sunningdale	.	.	.	" 23 "
Blackwater	.	.	.	" 31 "
Basingstoke	.	.	.	" 46 "
Stockbridge	.	.	.	" 67 "
Salisbury	" 81 "
Blandford	.	.	.	" 105 "
Dorchester	.	.	.	" 121 "

ROUTE IX

London to Southampton and Bournemouth

Hyde Park Corner

Kensington

Brentford . . . about 7 miles

Hounslow . . . " 10 "

Staines . . . " 17 "

Sunningdale . . . " 23 "

Blackwater . . . " 31 "

Basingstoke . . . " 46 "

Winchester . . . " 63 "

Southampton . . . " 76 "

Lyndhurst . . . " 86 "

Christchurch . . . " 100 "

Bournemouth . . . " 106 "

ROUTE X

London to Portsmouth

Westminster Bridge

Kennington

Clapham

Wandsworth . . . about 6 miles

Kingston . . . " 12 "

Long Ditton . . . " 14 "

Esher . . . " 16 "

Ripley . . . " 24 "

Guildford . . . " 30 "

Godalming . . . " 34 "

Hindhead . . . " 41 "

Liphook . . . " 47 "

Petersfield . . . " 55 "

Portsdown Hill . . . " 67 "

Cosham . . . " 68 "

Portsmouth . . . " 73 "

ROUTE XI

London to Horsham and Worthing

Westminster Bridge

Kennington

Clapham

Lower Tooting . . . about 6 miles

Merton . . . " 7 "

Morden . . . " 9 "

Epsom . . . " 15 "

Leatherhead . . . " 18 "

Dorking . . . " 23 "

Horsham . . . " 36 "

Washington . . . " 47 "

Broadwater . . . " 54 "

Worthing . . . " 56 "

ROUTE XII

London to Brighton

Westminster Bridge

Kennington Gate

Brixton

Streatham . . . about 6 miles

Croydon . . . " 10 "

Merstham . . . " 18 "

Redhill . . . " 20 "

Crawley . . . " 30 "

Handcross Hill . . . " 34 "

Hickstead . . . " 40 "

Piecombe . . . " 46 "

Brighton . . . " 52 "

ROUTE XIII

London to Tunbridge and Eastbourne

London Bridge

or

Westminster

New Cross

Lewisham	.	.	.	about 5 miles
Bromley	.	.	.	" 10 "
Farnborough	.	.	.	" 14 "
Halstead	.	.	.	" 18 "
Dunton Green	.	.	.	" 21 "
Sevenoaks	.	.	.	" 24 "
Tunbridge	.	.	.	" 30 "
Tunbridge Wells	.	.	.	" 36 "
Frant	.	.	.	" 38 "
Mayfield	.	.	.	" 45 "
Hailsham	.	.	.	" 58 "
Polegate	.	.	.	" 61 "
Eastbourne	.	.	.	" 66 "

ROUTE XIV

London to Hastings and St. Leonards

London Bridge

or

Westminster

New Cross

Lewisham . . . about 5 miles

Bromley . . . „ 10 „

Farnborough . . . „ 14 „

Halstead . . . „ 18 „

Dunton Green . . . „ 21 „

Sevenoaks . . . „ 24 „

Tunbridge . . . „ 30 „

Lamberhurst . . . „ 40 „

Hurst Green . . . „ 47 „

Robertsbridge . . . „ 50 „

Battle . . . „ 55 „

Hastings

and

St. Leonards . . . „ 62-3 „

ROUTE XV

London to Dover and Folkestone

London Bridge

or

Westminster

Deptford about 5 miles

Shoot-up-Hill " 9 "

Dartford " 15 "

Gravesend " 23 "

Strood " 27 "

Rochester

and

Chatham " 29-31 "

Sittingbourne " 42 "

Faversham " 48 "

Canterbury " 57 "

Ewell " 69 "

Dover " 72 "

(To Folkestone by the same route as far as

Canterbury ; afterwards turning to the
right.)

ROUTE XVI

London to Margate and Ramsgate

Westminster

or

London Bridge

New Cross

Deptford

Blackheath Hill . . . about 5 miles

Shooter's Hill . . . " 8 "

Dartford . . . " 15 "

Gravesend . . . " 22 "

Rochester . . . " 29 "

Sittingbourne . . . " 40 "

Dunkirk . . . " 51 "

Canterbury . . . " 55 "

Sarre . . . " 63 "

Birchington . . . " 67 "

Margate . . . " 71 "

Ramsgate and Broadstairs are close by.

ROUTE XVII

London to Colchester and Harwich

Bank of England

Whitechapel

Bow

Stratford . . . about 5 miles

Romford . . . „ 12 „

Brentwood . . . „ 18 „

Ingatestone . . . „ 24 „

Chelmsford . . . „ 30 „

Kelvedon . . . „ 42 „

Colchester . . . „ 52 „

(Side route to Walton-on-
the Naze, 17 miles)

Manningtree . . . „ 62 „

Harwich . . . „ 73 „

ROUTE XVIII

London to Ipswich and Yarmouth

Bank of England

Whitechapel

Bow

Stratford about 5 miles

Romford " 12 "

Brentwood " 18 "

Ingatestone " 24 "

Chelmsford " 30 "

Kelvedon " 42 "

Colchester " 52 "

Ipswich " 70 "

(Side route to Felixstowe,
12 miles)

Woodbridge " 78 "

Wickham Market " 83 "

(Side route to Framling-
ham, 6 miles)

Saxmundham " 90 "

Yoxford " 94 "

(Side route to Southwold,
10 miles)

Wrentham " 106 "

Lowestoft " 114 "

Gorleston " 122 "

Yarmouth " 124 "

ROUTE XIX

London to Norwich

Bank of England

Whitechapel

Bow

Stratford . . . about 5 miles

Romford . . . " 12 "

Brentwood . . . " 18 "

Ingatestone . . . " 24 "

Chelmsford . . . " 30 "

Little Waltham . . . " 34 "

Braintree . . . " 41 "

Halstead . . . " 48 "

Sudbury . . . " 56 "

Bury St. Edmunds . . . " 71 "

Thetford . . . " 83 "

Attleborough . . . " 94 "

Wymondham . . . " 100 "

Norwich . . . " 110 "

Norwich is distant from Yarmouth only 22 miles; and from Cromer, direct north through Aylsham, 23 miles.

ROUTE XX

London to King's Lynn

Bank of England

Shoreditch . . .	about 1 mile
Stoke Newington . . .	„ 3 miles
Tottenham . . .	„ 6 „
Ponder's End . . .	„ 10 „
Hoddesdon . . .	„ 18 „
Ware . . .	„ 22 „
Buntingford . . .	„ 32 „
Royston . . .	„ 39 „
Harston . . .	„ 45 „
Cambridge . . .	„ 52 „

(Side route to Newmarket,
13 miles; which may be
continued to Thetford, 19
miles; thence to Norwich,
29 miles further)

Waterbeach . . .	„ 57 „
Ely . . .	„ 68 „
Littleport . . .	„ 73 „
Downham Market . . .	„ 86 „
Lynn . . .	„ 98 „

(By Harpley, Fakenham
and Holt to Cromer, 43
miles)

XXI

SEVERAL short runs, each occupying in going and returning from London from $2\frac{1}{2}$ to $4\frac{1}{2}$ hours, not included among the foregoing longer routes. Most of them are delightful excursions to favourite spots on the banks of the Thames.

London to Richmond

- A.** Cross the river by Hammersmith Bridge, follow the long straight road, then cross Barnes Common to Mortlake and Richmond, entering the Park by the Sheen Gate, or by any other; make the entire circuit of the Park, the length of which is $8\frac{1}{2}$ miles; or you may leave it by any other gate, for example, by the Star and Garter gate, seeing the fine view from the road just below the building. Or you may go through the town of Richmond itself, crossing the river by the bridge below, and take the course through Twickenham, which leads to the site of Pope's Villa and Grotto, then on the left to Horace Walpole's Villa close by.

London to Staines

- B.** Hyde Park Corner, Kensington, past Holland House and Park, Hammersmith Broadway, Chiswick, Kew, to Brentford (about 7 miles), Hounslow to Staines (17 miles), over the bridge there; turn to the right and keep straight on alongside the river with Runnymede and Cooper's Hill on the left, soon coming to Magna Charta Island in the middle of the river on the right, to the Bells of Ouseley on the bank, from which point Old Windsor may be reached within a mile. Eton, Windsor, and Datchet are close by.

London to Thames Ditton

- C.** Cross the river by Hammersmith Bridge, follow the long straight road, then across Barnes Common, then by Roehampton Lane to Wimbledon Common; turn sharp to the right along the main road to Kingston, then to the left on reaching Kingston Bridge, past the "Coronation Stone" or

King-stone, following the river to just beyond the Waterworks; then to the right to Thames Ditton to the Old Swan Inn, rendered famous by Theodore Hook's Ode reciting its beauties in respect of situation and its accommodation for the rest-seeking traveller.

London to Sunbury

- D.** Take the same route as **A** to Richmond, and over the Bridge to Twickenham; then take the right-hand road to Twickenham Green, then to the left to Hampton; from here along the river bank to Sunbury.

London through Bushey Park to Molesey

Take the same route as **D** to Twickenham; pass Pope's Villa, over Teddington Bridge; then to the left through Teddington to Bushey Park, through the Park to Hampton Court Palace, then over Hampton Court Bridge; turn to the right alongside the river through East to West Molesey.

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Mapledurham, Whitchurch and Pangbourne, three of the most delightful spots on the Thames, are all within from three to six miles of Reading. (See Route VI. *ante*.)

INDEX

- ACCESSORIES** necessary, 66
- BATH ROAD, The Old**, 40
- Brake**, 37
- CAR, The Author's**, 13
- Certificated drivers**, 50
- Cooling apparatus**, 60
- DRIVERS** of horses unwise,
15; to blame for acci-
dents, 17
- Drivers, of Motors, Cer-
tificated**, 50; equipment
for, 72; qualifications
of, 65
- ELECTRIC** ignition, 57
- Electric motors**, 63
- FRANCE, Motor-cars in**, 20
- "Furious Driving": what
is it?** 29, 46
- GEARINGS**, 41, 60
- "Goggles,"** 73
- HEALTH** and the Motor,
74
- Horse and Motor**, 15, 18,
32, 34
- Horse, How to break in**,
34; must be taught to
meet motor, 18, 32; no
speed limit for, 45
- How Motor-drivers are
trapped**, 42
- How to cross-examine**, 43
- LEGAL** speed of Motors,
23, 41
- Letters to *The Times***, 15
- MANAGEMENT** of Motor,
59
- Monson, Sir Edmund, on
Motor-cars in France**,
20
- Motor as road-protector**,
69; as sanitary re-
former, 70; how it is
controlled, 37; the best
far the cheapest, 75;
tax on, 76; varieties of,
52

Motor-car, The Author's,
13; electric, 63; petrol,
53; steam, 62; tyres
for, 71

Motoring in towns, 36

NINE-WEEKS' Tour, A, 14
Numbering Motor-cars,
24

PETROL-MOTORS, 53; ac-
tion of, 55-56

Pleasures of Motor-riding,
77

Pneumatic tyres, 72

Provision for bad weather,
75

Pulling up quickly, 37

REGISTRATION of Motor-
cars, 31

Roads for the use of all,
28; good and bad, 67

Routes for Motor rides,
81

SOLID tyres, 71

Spectator, The, on Motor-
cars, 48

Speed in towns, 36; in
country, 38, 47; legal,
23, 41

Steam-motors, 62

Stop-watch for testing
speed, 45

Tax on Motors, 76

Times, The, Letters to, 15;
leading article on

Motor-cars, 26

Tube ignition, 55

"WATLING STREET," an
old Roman road, 40

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